

ATTACHMENT B

CLAIMS:

Claims 1-8 (canceled)

- 9. (new)** A method for virtual orthodontic treatment, comprising:
- (a) providing a first virtual three-dimensional (3D) image indicative of a 3D model of all teeth of at least one jaw, the model being manipulable so as to allow its viewing from a desired direction;
 - (b) selecting a virtual set of orthodontic components, comprising (i) brackets, one for each tooth in said first image, for attachment to teeth of said image, each of said brackets having a slot for engaging an arch wire, and (ii) one or two arch wires, one for each jaw of said first image;
 - (c) associating the brackets with the teeth of said first image so as to obtain a second image of said virtual 3D model with the brackets associated with the teeth of the model, one bracket on each teeth in said model; and
 - (d) using a set of rules including a rule that requires each slot to engage the wire, computing the manner of movement of each tooth with the bracket associated therewith, so as to obtain a third image comprising the teeth model following the virtual treatment.
- 10. (new)** A method according to Claim 9, wherein steps (c) and (d) are repeated a plurality of times until yielding a desired result of said treatment.
- 11. (new)** A method according to Claim 9, wherein said virtual 3D model includes teeth of both the upper and lower jaws.
- 12. (new)** A method according to Claim 9, comprising providing a user interface and wherein said selecting comprises using the user interface for selecting the virtual set of orthodontic components.
- 13. (new)** A method according to Claim 12, wherein said associating comprises manually associating the selected brackets with the teeth of said first image.
- 14.** A method for designing an orthodontic treatment of teeth of at least one jaw, comprising:

(One) providing a first virtual three-dimensional (3D) image indicative of a 3D model of teeth of at least one jaw, the model being manipulable so as to allow its viewing from a desired direction;

(Two) selecting a virtual set of orthodontic components, comprising (i) brackets, one for each tooth in said first image, for attachment to teeth of said image, each of said brackets having a slot that for engaging an arch wire, and (ii) one or two arch wires, one for each jaw of said first image; said orthodontic components corresponding to those intended to be used in said orthodontic treatment;

(Three) associating the brackets with the teeth of said first image so as to obtain a second image of said virtual 3D model with the brackets associated with the teeth of the model, one bracket on each teeth in said model, the association corresponding to a manner in which the brackets are associated with the teeth in said orthodontic treatment;

(Four) using a set of rules including a rule that requires each slot to engage the wire, computing the manner of movement of each tooth with the bracket associated therewith, so as to obtain a third image comprising the teeth model after movement of the teeth as a result of such engagement;

(Five) if desired, repeating steps (c) and (d) until a desired third image is obtained, said third image representing a desired position and orientation of teeth following the orthodontic treatment; and

(Six) recording said second image that yields following step (d) the desired third image and using it for designing the orthodontic treatment.

15. (new) A method according to Claim 14, comprising providing a user interface and wherein said selecting comprises using the user interface for selecting the virtual set of orthodontic components.

16. (new) A method according to Claim 14, wherein said associating comprises manually associating the selected brackets with the teeth of said first image.

17. (new) A method for virtual orthodontic treatment, comprising:

(One) providing a first virtual three-dimensional (3D) image indicative of a 3D model of teeth of at least one jaw, the model being manipulable so as to allow its viewing from a desired direction;

(Two) selecting a virtual set of orthodontic components, comprising (i) brackets, one for each tooth in said first image, for attachment to teeth of said

image and one or two arch wires, one for each jaw of said first image; each of the brackets defining a SLOT right angle XYZ coordinate system with an X axis is parallel to the slot axis, a Z axis that points out in the direction of the wire's insertion into the slot and a coordinate system's origin that touches the bracket within the slot at a center thereof, and defining a BOND right angle coordinate system with an X axis that is parallel to the X axis of the SLOT frame, a Z axis that is perpendicular to the bracket's back surface and a coordinate system's origin that touches the back surface at the center thereof; each arch wire defining a spline curve that touches the inner, bracket-facing surface of the wire, the spline curve in turn defines a spline plane;

(Three) associating each of the brackets to a tooth such that the origin of the BOND coordinate system is on the surface of the tooth with the Z axis being perpendicular to tooth surface, so as to obtain a second image of said virtual 3D model with the brackets associated with the teeth of the model; and

(Four) bringing the arch wire for a jaw into proximity to the teeth of said jaw and for each tooth bracket determining a point on the spline from which distance to origin of the tooth-associated bracket's SLOT coordinate system is minimal and moving the tooth to bring the origin of the SLOT coordinate system to the determined point, Z of the SLOT coordinate system is on said spline plane and the X axis of the SLOT coordinate system tangents the spline curve of the arch wire, thereby obtaining a third image comprising the teeth model following the virtual treatment.

18. (new) A method according to Claim 17, wherein steps (c) and (d) are repeated a plurality of times until yielding a desired result of said treatment.

19. (new) A method according to Claim 17, wherein said virtual 3D model includes teeth of both the upper and lower jaws.

20. (new) A method according to Claim 17, wherein step (d) comprises defining anchoring teeth in each jaw and changing the shape of the arch wires such to permit teeth other than the anchoring teeth to slide along the arch wire until there is no collision between teeth.

21. (new) A method according to Claim 17, comprising providing a user interface and wherein said selecting comprises using the user interface for selecting the virtual set of orthodontic components.

22. (new) A method according to Claim 17, wherein said associating comprises manually associating the selected brackets with the teeth of said first image.

23. (new) A method for designing an orthodontic treatment of teeth from at least one jaw, comprising:

(One) providing a first virtual three-dimensional (3D) image indicative of a 3D model of teeth from at least one jaw, the model being manipulable so as to allow its viewing from a desired direction;

(Two) selecting a virtual set of orthodontic components, comprising (i) brackets, one for each tooth in said first image, for attachment to teeth of said image and one or two arch wires, one for each jaw of said first image; each of the brackets defining a SLOT right angle XYZ coordinate system with an X axis in parallel to the slot axis, a Z axis that points out in the direction of the wire's insertion into the slot and a coordinate system's origin that touches the bracket within the slot at a center thereof, and defining a BOND right angle coordinate system with an X axis that is parallel to the X axis of the SLOT frame, a Z axis that is perpendicular to the bracket's back surface and a coordinate system's origin that touches the back surface at the center thereof; each arch wire defining a spline curve that touches the inner, bracket-facing surface of the wire, the spline curve in turn defines a spline plane; said orthodontic components corresponding to those intended to be used in said orthodontic treatment;

(Three) associating each of the brackets to a tooth such that the origin of the BOND coordinate system is on the surface of the tooth with the Z axis being perpendicular to tooth surface, so as to obtain a second image of said virtual 3D model with the brackets associated with the teeth of the model, the association corresponding to a manner in which the brackets are associated with the teeth in said orthodontic treatment;

(Four) bringing the arch wire for a jaw into proximity to the teeth of said jaw and for each tooth bracket determining a point on the spline from which distance to origin of the tooth-associated bracket's SLOT coordinate system is minimal and moving the tooth to bring the origin of the SLOT coordinate system to the determined point, Z of the SLOT coordinate system is on said spline plane and the X axis of the SLOT coordinate system tangents the spline curve of the arch wire, thereby obtaining a third image comprising the teeth model following the virtual treatment;

(Five) if desired, repeating steps (c) and (d) until a desired third image is obtained, said third image representing a desired position and orientation of teeth following the orthodontic treatment; and

(Six) recording said second image that yields following step (d) the desired third image and using it for designing the orthodontic treatment.

24. (new) A method according to Claim 23, wherein step (d) comprises defining anchoring teeth in each jaw and changing the shape of the arch wires such to permit teeth other than the anchoring teeth to slide along the arch wire until there is no collision between teeth.

25. (new) A system for virtual orthodontic treatment, comprising:

(One) storage means that can store a first virtual three-dimensional (3D) first image indicative of a 3D model of all teeth of one or two jaws of an individual;

(Two) user interface for enabling selection of a virtual set of orthodontic components, comprising (i) brackets, for attachments to teeth of said first virtual 3D image, each of said brackets having a slot for engaging an arch wire, and (ii) one or two arch wires, one for each jaw of said first image;

(Three) processor capable of:

(c1) manipulating said 3D model to allow its viewing from a desired direction;

(c2) associating the brackets with the teeth of said first image so as to obtain a second image of said virtual 3D model with the brackets associated with the teeth of the model, one bracket on each tooth in said model; and

(c3) using a set of rules comprising a rule that requires each slot to engage the arch wire, computing the manner of movement of each tooth with the bracket associated therewith, so as to obtain a third image comprising the teeth model following the virtual treatment;

(Four) display for displaying the images.

26. (new) A system for virtual orthodontic treatment, comprising:

(One) storage means that can store a first virtual three-dimensional (3D) first image indicative of a 3D model of all teeth of one jaw or two jaws of an individual;

(Two) user interface for enabling selection of a virtual set of orthodontic components, comprising (i) brackets for attachments to teeth of said first virtual

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3D image, each of said brackets having a slot for engaging an arch wire, there being one bracket for each tooth in said virtual 3D image, and (ii) one or two arch wires, one for each jaw of said first image;

(Three) processor capable of:

(c1) manipulating said 3D model to allow its viewing from a desired direction; and

(c2) carrying out the method defined in Claim 17; and

(d) display for displaying the images.